NOVA SCOTIA ELECTRICITY MARKETPLACE GOVERNANCE COMMITTEE

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INTRODUCTION TO MARKET POWER ISSUES

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1 INTRODUCTION

This issues paper provides an initial introduction to and general background information on market power issues in wholesale electric power markets. When designing an electric power market consideration needs to be given to the likely competitiveness of the market and the market power mitigation strategies that could be employed to enhance the market competitiveness. The starting point for this assessment is the scope of the market, i.e., the definition of the competitive market, and the objectives that support the development of this market.

This issues paper focuses initially on defining market power and describing the conditions under which it can be exercised and evaluates it within the context of different market models. Market power issues in the Nova Scotia market are then reviewed and a proposal is made regarding the focus of market power mitigation efforts.

2 DEFINITION OF MARKET POWER

Market power is defined as the ability of a seller, or group of sellers acting in concert, to profitably maintain prices above competitive levels for a significant period of time.[1] There are two key parts to note about this definition. First, the price increase must be profitable for the firm exercising market power, i.e., the firm's output is not displaced by competing supplies such that the revenue loss causes the price increase to be unprofitable. Second, the price increase and profits must be sustained for a significant period of time. "Competitive levels" are defined as the price levels that would prevail in a competitive market.

Market power is of concern because it can, if exercised, impose costs on society. The exploitation of market power can significantly erode the consumer benefits that would be expected to result from the transition from regulated to competitive markets for electricity generation. In those markets where market power is exercised, output is restricted to less than the "efficient" level and prices are increased above competitive levels. This causes a misallocation of resources, including a transfer of wealth from the consumer to producer and a net welfare loss for society. Therefore, in a market where a supplier, or group

[1] U.S. Department of Justice (DOJ) and Federal Trade Commission (FTC), *Horizontal Merger Guidelines*, April 2, 1992, at www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html.

of suppliers acting in concert, is able and chooses to exercise market power, economic efficiency will not be fully realized.

2.1 Forms of Market Power

There are two general forms of market power: vertical and horizontal. Vertical market power can arise from the ownership or control of more than a single step in the production and delivery of a particular product. Vertical market power can be exercised to limit entry and to provide preferential treatment for affiliates that are operating at another stage of the production or delivery process. Horizontal market power can arise if a single entity or small group of entities owns or controls most of the productive resources at a particular level of production (e.g., wholesale markets). Horizontal market power can be exploited to raise prices or maintain barriers to entry.

In the U.S. vertical market power has been addressed in part by development of Federal Energy Regulatory Commission (FERC) mandated Open Access Transmission Tariffs (OATTs) and subsequent FERC efforts to develop Regional Transmission Organizations (RTOs). As already discussed with the EMGC, open access transmission service also plays a critical role in enabling wholesale competition. Furthermore, it is intended to address the vertical market power issues that arise from one electric utility owning both electric transmission facilities that are essential for securing market access and electric generating facilities that compete with other generators for access to these transmission facilities and profit from sales to competitive customers using these transmission facilities.[2]

Horizontal market power can be exercised in two basic ways – economic withholding and physical withholding. Economic withholding occurs in a pool market when an offer price is submitted above competitive prices with a view to influencing the market-clearing price. Physical withholding occurs either when economic energy without a physical operational constraint (i.e. forced outage or scheduled maintenance) is not offered to the market or when a supplier deliberately does not meet the energy dispatch level established by the system controller with the objective of raising price.

[2] In its Notice of Proposed Rulemaking on RTOs, FERC suggested that continued discrimination in the provision of transmission services by vertically integrated utilities may be impeding fully competitive electricity markets. RTOs are designed to increase the level of independence for transmission service providers.

3 CRITERIA FOR ASSESSING THE COMPETITIVENESS OF POWER MARKETS

A range of factors should be considered when evaluating the competitiveness of a market. These include (1) market share of suppliers; (2) overall market concentration; (3) elasticity of demand; (4) the shape and slope of the industry supply curve; (5) the amount and distribution of excess supply; (6) typical contractual arrangements and the process for establishing prices; and (7) the easy of market entry. The elasticity of demand and shape of the industry supply curve are critical issues in real-time power markets organized around bid-based pools.

Typically, the first step in assessing a market's competitiveness is to evaluate the market structure. A structural assessment of a market is a screening device that can indicate the possible presence or absence of market power. If a structural assessment indicates that a market is likely to be competitive, no additional analysis may be needed. Conversely, if a structural assessment indicates that a market may be subject to the exercise of market power by a supplier or a group of suppliers, then further analysis is needed.

Two key structural thresholds used to indicate the potential for market power are market share and market concentration. In general, market power is related to market share. A supplier's market share is used to provide an indication of its incentive to withhold supply from the market to raise prices "because it relates to the ability to restrict supply and to the proportion of benefits from a price increase that will be captured by the firm."[3] If a supplier has a relatively limited amount of capacity operating which would be receiving market-clearing prices, then the benefits it receives from the increase in price is more likely to be small. Furthermore, individual firms with relatively low market shares will be unable to exercise significant market power because their output can be easily replaced if they attempt to raise prices above competitive levels.

In its hub and spoke analysis framework that was employed by FERC to assess whether suppliers should be granted authority to charge market- based rates in bilateral contract markets, FERC found that a market share in the electric power market of less than 20 percent is an indicator of a lack of market power. In a number of cases, FERC has found that a market share of approximately 25 percent was not a concern when granting authority to charge market-based

[3] DOJ, *In the Matter of Merger Policy Under the Federal Power Act*, comments, p. A7.

rates. FERC has subsequently dropped this hub and spoke framework for the pivotal supplier index. This pivotal supplier index is better suited to evaluating the potential presence of market power in bid-based pools.

Market concentration is typically used to assess the competitive effects of a merger or to determine the whether a supplier should be subject to price regulation. A commonly used gauge for determining the degree of market concentration is the Herfindahl-Hirschman Index (HHI). The HHI is calculated as the sum of squares of the market shares of the companies in the market. With respect to the analysis of the impact of mergers on market competitiveness, U.S. federal antitrust agencies and FERC call a market with an HHI greater than 1,800 "highly concentrated". An example of a market with an HHI of 1,800 would be a market with five to six equal sized competitors. These structural measures of market competitiveness suggest that five or more competitors are required to achieve a workably competitive market, with possibly fewer competitors required for a bilateral contract based market which is appropriate for Nova Scotia.

Once a structural screen has been applied, other criteria come into play. Ease of entry into the market is an important criterion for evaluating the competitiveness of a market. According to economic theory, if a market is contestable, i.e., the threat of entry is sufficient, and then even a monopolistic market can behave competitively. Contestability of a market can be determined by the degree to which entry to the market is "easy". Entry is considered easy if it would be: (1) timely, i.e. within a sufficiently short period of time to limit significantly the profits of the firm exercising market power; (2) likely, i.e., profitable to the firm entering the market and thereby making such entry likely; (3) sufficient, i.e., of a magnitude of the competing product to make the uncompetitive behavior unprofitable. In circumstances where entry is likely, timely, and sufficient to deter or counteract efforts to exercise market power, market concentration may not have adverse implications for consumers. Therefore, full treatment of entry conditions, both present and future, is an important aspect of competition analysis. New entry may be either new or expanded capacity within the existing geographic market, or enhanced access to existing, but distant or isolated, generating capacity by virtue of new or expanded transmission capacity.

Under the standards used by U.S. federal antitrust agencies and FERC, entry is not timely and hence easy if more than two years would be required from initial planning to significant market impact. Most types of generating units and significant transmission facilities require more than two years for planning, approval, and construction. Therefore, ease of entry generally

cannot be viewed as effectively constraining the exercise of market power in wholesale power markets. Furthermore, given the significant price volatility inherent in pool-based markets it is not clear that a two year time frame is appropriate for such a market model.

Nonetheless, if there are no undue barriers to entry then over the longer term bilateral markets can be viewed as workably competitive. Furthermore, the longer contract terms that are prevalent in the bilateral contract market are more consistent with the timing required for new entry. The barriers to entry to bilateral contract markets are reviewed below in Section 5.

3.1 Inherent Competitiveness of Different Market Models

3.1.1 Bid-Based Pool Markets

In general, a bid-based pool market that clears on a real-time basis every hour or every half-hour is more susceptible to the exercise of market power than a bilateral contract-based market. In a bid-based pool market, if generators are able to change their offers such that they know that their energy will be required to clear the market, they can become price-setting capacity. With short trading intervals and with offer prices presented on a real-time basis, generators are better able to capitalize on periods of tight supply, which allow them to withdraw supply to induce a profitable price increase. Under these conditions, any generator with capacity that is required to satisfy demand is in a position to set prices. Therefore, any supplier whose market share is greater than the reserve margin during peak periods can potentially establish market prices.[4] Thus, market share is only one element of assessing the likely competitiveness of a power market with a bid-based pool. Just as important as market share, is the market's reserve margin and suppliers' market shares relative to this reserve margin. This is the primary reason why FERC established its new market power screen called the pivotal supplier index and has dropped its previously employed "hub and spoke" analysis.

3.1.2 Bilateral Contract Market

An important advantage of a bilateral market is that it is generally less susceptible to the exercise of market power than bid based pools. As discussed, in a real time market where demand and supply are matched on an hourly

[4] See Federal Energy Regulatory Commission, "Order on Triennial Market Power Updates and Announcing New, Interim Generation Market Power Screen and Mitigation Policy", Issued November 21, 2002.

basis, any supplier with resources that are required to satisfy demand has the ability to influence prices.

In a bilateral contract market pricing decisions are made over significantly longer time frames. This limits the ability of a supplier to attempt to capitalize on its position as a pivotal supplier during limited periods of the year. Under the longer trading intervals that prevail in bilateral markets the supplier must balance off the ability to earn higher prices during peak periods when its supplies are required with the risk that its resources would not be contracted during off-peak periods.

Because a supplier can execute a forward contract for a multi-year term, it can "cheat" on a cartel and lock-in a price that profitably just undercuts the uncompetitive market price. These contracts are likely to be confidential and, as such, would enable suppliers to undercut any tacit or explicit pricing agreements. Therefore, bilateral contract markets contain pro-competitive influences that are not necessarily present in bid-based pools.

A critical issue in assessing the competitiveness of bilateral contract markets is identifying the alternatives that are available to customers. If there are no viable alternatives to customers than service by the incumbent supplier at market-based rates then there is a dramatically higher risk of the abuse of market power.[5] However, if a Standard Offer Service (SOS)[6] is available from the incumbent or competitive service is readily available from other suppliers, then the risk of the abuse of market power is reduced. For example, under the New Brunswick market design, NB Power is committed to supplying SOS customers' entire requirements. This was recognized as a strong deterrent to the exercise of market power.[7]

The provision of SOS service for contestable customers does not ensure a competitive market. It only mitigates any market power that might exist. Experience with other markets indicates that the most significant market power issues with the development of bilateral contract markets relate to

[5] When applying its previously employed "hub and spoke" test for determining who should be granted authority to charge market-based rates, the FERC uses a 20% market share as an indicator of whether an electric utility was could be in a position to exercise market power.

[6] SOS is the service that is provided to contestable customers that do not elect to be served by a competitive supplier.

[7] The right to return to SOS under the same terms and conditions as the customer left is also an effective "safe harbor" against the exercise of market power by suppliers. However, this right either requires cost shifting from customers that did leave to those who did not or it is a burden to the supplier.

providing sufficient liquidity and ensuring that there are no undue barriers to entry.

4 MARKET POWER AND MARKET SCOPE

Any assessment of the competitiveness of the restructured Nova Scotia electricity market depends on the market scope embraced by the EMGC. A narrow definition of market scope requires that the focus be primarily on implementing a transmission tariff that provides non-discriminatory, open access service. A narrow market scope assumes that only the wholesale (municipal) market sector is available to competitive suppliers. However, the small size of the wholesale market is likely to be a deterrent to meaningful enhancements to market competitiveness, i.e., an increase in the number of Nova Scotia suppliers and thus an increase in market liquidity. With less than 2% of the Nova Scotia market open there are likely to be limited opportunities for the development of local generation projects that are developed to serve these wholesale customers. Under these conditions, the focus is likely to be on ensuring equal transmission access by all parties.

A more expansive definition of market scope contemplates sales of energy to industrial customers and may justify additional policies to realize the potential offered by a larger competitive market. With greater market opportunities there is greater potential for competitors to enter the Nova Scotia market. In the long term, market development in Nova Scotia would focus on removing barriers to entry to enhance prospects for competitive generation entry.

4.1 Nova Scotia Power as the Incumbent Electric Utility

With a customer franchise to serve the vast majority of Nova Scotia, Nova Scotia Power Inc (NSPI) is the dominant utility in Nova Scotia. NSPI operates 97 percent of generating capacity, 99 percent of transmission capacity, and 95 percent of the distribution system in the province.

4.2 Limitations on the Competitiveness of the Nova Scotia Market

Nova Scotia is a small market by North American standards. NSPI's current generating capacity is approximately 2,200 MW. The *Energy Strategy* acknowledged NSPI's small size: "the economic advantage of retaining the economy of scale of a relatively small, vertically integrated utility like NSPI is considered to be very important for Nova Scotia's residential and business

sectors."[8] The *Energy Strategy* recognized that the small size of Nova Scotia Power's generation fleet prevents implementing a horizontal disaggregation strategy (i.e., mandated sale of generating capacity) to realize the objective of workable competition. This would likely result in a significant loss of economies of scale. Research that Navigant Consulting has performed for other clients suggested that the minimum efficient scale (MES) for generation fleets is approximately 3,400 MW.[9] Nova Scotia Power's existing portfolio of 2,200 MW is well below this MES. Therefore, horizontal dissaggregation would require that Nova Scotia Power forego the economies of scale that it currently realizes and result in higher costs for consumers.

Over the next 20 years, Nova Scotia's projected load growth will require supply additions of a least 350 MW of new peaking capacity. The incremental generating capacity is expected to include natural gas-fired and wind generation.

4.3 Implications of Different Market Scopes

There are several possible levels of restructuring Nova Scotia's electric power market in terms of market scope.

The *Energy Strategy* proposed allowing existing wholesale (municipal) customers to buy their electricity supply from alternative supply sources. The municipal distribution customers comprise only 1.6 percent of the total electricity demand in Nova Scotia. The market would require minimal restructuring requiring primarily non-discriminatory, open access transmission and unbundling the transmission costs from the costs of energy supply, distribution, and retail marketing. It is highly unlikely a competitive market can be developed based on a load of approximately 37 MW. By comparison, this would not support a General Electric LM 6000 gas turbine, which is considered by many project developers to be the minimum commercial sized generation investment. Clearly, generation developers could locate in Nova Scotia and use the open access transmission tariff to access other markets. These siting decisions would be based on the relative economics of natural gas versus electric transmission tariffs and the ability to secure the necessary transmission capacity.

[8] *Seizing the Opportunity*, Vol. II, p. 15.

[9] This is based on the average MES calculated from five different studies that estimated the MES for electric utility generators.

As discussed further in the Market Scope Issues Paper in order to develop a more competitive market in Nova Scotia, it is likely that demand greater than that offered by municipal customers must be made available for competitive supply. The next step proposed in the Market Scope Issues Paper would be to allow large industrial consumers to purchase energy from suppliers other than NSPI. Large industrial customers, i.e., those with connections of 2 MVa (1.8 MW) or more, account for approximately 25 – 30 percent of total NSPI energy demand. Additional market development costs (including market power mitigation strategies) would be required.

5 FOCUSING ON BARRIERS TO ENTRY

Unless the existing dispatch of the system is grossly inefficient and a bid-based pool is being established to increase operating efficiencies, the vast majority of savings from wholesale market restructuring is likely to come from introducing market discipline to major capital investment decisions, in particular building new generating plant. With investors accepting the market and operating risks of major new capital investment, the party that is best able to manage these risks is responsible for bearing them. Therefore, if we are to pursue a bilateral market model as the preferred strategy for realizing the benefits offered by increased competition in the wholesale market, we need to ensure that all barriers to entry are addressed since the key to increased competition in the wholesale market is the development of additional independent generation capacity.

There are a number of factors that represent potential barriers to entry for wholesale electric power markets. These include: (1) access to the transmission infrastructure and transmission services; (2) sites for new capacity development; (3) key inputs to generation; (4) transportation of key inputs to generation; and (5) lack of liquidity. In its evaluation of US power markets, FERC has generally found that the first four potential barriers to entry do not impede the development of generating capacity. Furthermore, given the size of US power markets and significant number of suppliers and buyers insufficient liquidity has also not been a barrier to entry.

5.1 Access to the Transmission Network and Transmission Services

Probably the most significant potential barrier to entry is the inability to secure access to the transmission network and to secure transmission service under terms that are equivalent to those offered to other generators, most

particularly the generation affiliated with the incumbent transmission service provider. Two and one-half years ago FERC issued rules that went beyond its initial effort at mandating an open access transmission framework and attempting to eliminate discrimination with respect to the provision of transmission service. In this decision (i.e., Order No. 2000) FERC noted that its current behavioral and structural rules for open transmission access have not solved all transmission discrimination problems in the electric power industry.

If generators are overly concerned that transmission scheduling and pricing can be used by the incumbent to secure a competitive advantage, then they are likely to be reluctant to enter the market. Transmission scheduling must provide all parties with equal rights and access when reserving transmission capacity. Clear non-discriminatory rules must be established and applied consistently for determining who receives access to transmission capacity.

As recognized by FERC in Order No. 888, an essential element of transmission services is the provision of ancillary services. Both FERC Order Nos. 888 and 2000 address the provision of ancillary services and ensure that the provision of these services does not represent an undue barrier to entry. Imbalance service is particularly important in markets such as Nova Scotia where there are not a significant number of competing suppliers that represent sources of this service. Therefore, new entrants are likely to be highly reliant on this service to balance their injections and withdrawals. The lack of a workable balancing framework has proven to be a significant barrier to entry to the development of new generation projects in Western Australia. Under the current balancing regime generators are incented to follow load rather than "spill" generation to the incumbent utility when they have surplus . In addition, they reduce their sales obligation to avoid having to take prohibitively expensive "top up" when they need additional generation.

5.2 Control Over Sites

A utility may be able to exercise market power in the long-run bulk power market if it is able to limit access to the preferred sites for developing new electric generation projects or if there is a lack of suitable sites for new projects. No single entity is likely to either own or control more than a few of what are likely to be the most suitable electric generation project sites to supply and, as such, is likely to be able to control these project sites in an attempt to limit entry and exert market power in the Nova Scotia geographic markets. Preferred sites are those with ready access to fuels (i.e., near a gas

transmission line), transmission (i.e., near a transmission line that has adequate take away capacity or can be expanded at relatively limited cost), and do not have any major environmental barriers to the development of the site.

5.3 Key Inputs to Generation

The third potential barrier to entry is control over key inputs to generation services. In addition to suitable sites for generation projects (discussed above) and the transportation of fuels for electric generation (discussed below), consideration is given to the ability to control the following key inputs to generation: (1) the supply of generation fuels; and (2) the supply of electric generation equipment.

As discussed above, the electric generation technologies that are most likely to be employed by new entrants are natural gas-fired. Therefore, the evaluation of whether the supply of generation fuels is likely to represent a barrier to entry should focus on natural gas and the ability of natural gas suppliers to the Nova Scotia market to limit access to natural gas supplies in an effort restrict entry to the long-run Nova Scotia generation market.

5.4 Transportation of Fuel for Electric Generation

The critical issue with ensuring that the transportation of natural gas is not a barrier to entry is ensuring that the pipeline that serves the market is an open access pipeline and, as such, is required to provide service to all parties that request it and cannot limit access to any one party. Furthermore, natural gas fired generators must not be able to use contract entitlements on gas transportation facilities to prevent a potential competitor from receiving service from the pipeline.

5.5 Lack of Market Liquidity

Another potential barrier to entry is lack of market liquidity. This is not a barrier to entry that can be deliberately erected by an incumbent to prevent entry, but is a very real requirement for many project developers.[10] Therefore,

[10] The alternative to having a relatively liquid market is negotiating a long-term contract where the buyer accepts the vast majority of market risk, i.e., when the unit is unavailable the seller is relieved of its power supply obligations.

one consideration when assessing the anticipated sufficiency of entry is to evaluate the liquidity of the market. In a bilateral market, there must be enough market participants to ensure that any given supplier or load has competitive alternatives available. In this regard, project developers access to a viable retail market is of critical importance to providing a market for their project's output.

By the same token, the lack of wholesale market liquidity effectively limits the supply options available to retail consumers. Lack of market liquidity inhibits the development of retail markets in bilateral markets with market dominant vertically integrated electric utilities since retailers are unable to procure competitive supply.

This lack of liquidity ties to the earlier discussion regarding the need for a competitively priced balancing service in markets with a limited number of competitive suppliers. This also takes the form of ensuring that generators have a means for sourcing sufficient competitively priced standby capacity when their generator is unavailable. Initially, the dominant incumbent generator may be the only viable source of standby supplies. New entrants must be confident that standby supplies will be available at prices that are fair and reasonable. The incumbent utility would have to be properly compensated for the opportunity cost of providing this service in place of committing capacity and selling power into the market.